

WHAT IS CLAIMED IS:

1. An automatic semiconductor device testing apparatus comprising:
a tray for holding a semiconductor device that has a cable, a device
5 body connected with one end of the cable, and a connector connected with the
other end of the cable, so that the connector can couple to a mating connector
directly or indirectly with the device held in the tray;

an inspection connector for automatically coupling to the connector
held in the tray;

10 a probe for applying or receiving signals to or from the device body,
being in contact with or close to terminals of the device body;

an inspection robot for picking up the device body held in the tray
and transporting it to the probe to get contact with or close to;

a controller to control the inspection robot; and

15 a tester for testing the device by applying input signals to one side of
the inspection connector or the probe and receiving output signals from the
other side.

2. The apparatus as claimed in claim 1, wherein the tray holds the
20 cable near the device body so that the cable is set along a connecting
direction of the device body, and that the cable can be guided in the
connecting direction when the device body is removed from or restored into
the tray.

25 3. The apparatus as claimed in claim 1, further comprising a pressing
mechanism for pressing the terminals of the device body on the probe in the
state that the device body is in contact with or close to the probe.

4. The apparatus as claimed in claim 1, further comprising a device
30 body imaging device for detecting the posture of the device body retained on

the inspection robot, wherein

said controller includes a reference posture storing section for storing a reference retained posture, and a posture error calculating section for calculating an error between the reference retained posture and the retained posture detected by the device body imaging device, and controls the inspection robot to transport the device body onto the probe together with correction of the calculated error.

5. The apparatus as claimed in claim 2, further comprising a tray transfer device for holding and transferring the tray, wherein said controller is adapted to control both of the tray transfer device and the inspection robot in synchronism with each other so that the device body can be transported from the detected position of the retained posture by the device body imaging device to the probe with the relative position between the device body and the cable maintained.

6. The apparatus as claimed in claim 5, wherein said tray transfer device is a rotation table to hold and rotatably transfer the tray, and the device body imaging device and the probe are arranged along an arced locus concentric with the table, and wherein the controller controls the inspection robot so that the device body rotatably moves along the arced locus from the device body imaging device to the probe.

7. The apparatus as claimed in claim 6, wherein the rotation table is capable of holding a plurality of trays.

8. The apparatus as claimed in claim 1, further comprising a probe imaging device for detecting a probe set position, wherein said controller has a reference position storing section for storing a reference set position of the probe, and a position error calculating section for calculating an error

between the reference set position and the probe set position detected by the probe imaging device, and controls the inspection robot so as to transport the device body onto the probe with the set position error corrected.

5 9. The apparatus as claimed in claim 8, wherein the probe imaging device can detect the position of the device terminals brought into contact with or close to the probe, and wherein the controller has a displacement calculating section for calculating the displacement between the probe and the terminals based on the probe set position and the position of the terminals, and an allowable value storing section for storing a given
10 allowable displacement value, and controls the inspection robot so that the device body can get into contact with or close to the probe with the displacement corrected if the calculated displacement is over the allowable value.

15 10. The apparatus as claimed in claim 1, further comprising:
a front-end system for executing a heat-retaining process to keep the device body in a given temperature, a dust removing process to remove foreign substance from the device body, and an electrostatic discharge
20 process to discharge static electricity from the device body; and
a front-end robot for picking up the device body held on the tray, and transferring it to the front-end system.

25 11. An automatic semiconductor device testing apparatus comprising:
a tray for holding a semiconductor device that has a cable, a device body connected with one end of the cable, and a connector connected with the other end of the cable, so that the connector can couple to a mating connector directly or indirectly with the device held in the tray;
30 a tray storage capable of storing a plurality of piled trays, having a

tray selecting mechanism for supporting a selected tray separated from adjacent trays, and an ejector for ejecting the tray supported on the selecting mechanism;

5 a transport mechanism for transporting the tray ejected from the tray storage sequentially to an inspection area with the device held in the tray;

an inspection connector for automatically coupling to the connector held in the tray at the inspection area;

10 a probe disposed at the inspection area for applying or receiving signals to or from the device body, being in contact with or close to terminals of the device body; and

a tester for testing the device by applying input signals to one side of the inspection connector or the probe and receiving output signals from the other side.

15 12. The apparatus as claimed in claim 11, wherein the transport mechanism is adapted to transfer back a tray, which holds the inspected device, to the tray storage, and wherein an unloader unloads the returned tray into an open space of the tray selecting mechanism.

20 13. A method for automatically testing a semiconductor device, the device having a cable, a device body connected with one end of the cable, and a connector connected with the other end of the cable, the method comprising the steps of:

25 holding the device in a tray so that the connector can couple to a mating connector directly or indirectly;

storing a plurality of the trays in a tray storage;

selecting a certain tray from the tray storage;

30 transporting the selected tray sequentially to an inspection area with the device held in the tray;

coupling automatically an inspection connector to the connector held in the tray at the inspection area;

bringing the device body into contact with or close to a probe;

- 5 testing the device automatically and continuously by applying input signals to one side of the inspection connector or the probe and receiving output signals from the other side; and

returning the tray after the test into the tray storage on its expected step position.